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Bushmen Cave Paintings of Ornithopod Dinosaurs: Paleolithic Trackers Interpret Early Jurassic Footprints

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ICHNOLOGIC NOTE

Bushmen Cave Paintings of Ornithopod Dinosaurs: Paleolithic Trackers Interpret Early Jurassic Footprints

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Remnants of Bushmen cave paintings showing representations of dinosaurs evidently reconstructed from footprints, trackways and skeletal remains have been found in Lesotho. This is a region of prolific dinosaur trackways preserved in Lower Jurassic sedimentary rocks, and the Bushman culture is renowned for extraordinary skill in the tracking of modern animals. It is probable that the track and trackmaker representations depict ornithopod dinosaurs. The track drawings are accurate, and the trackmaker representations show that Bushman artists anticipated modern reconstructions of bipedal dinosaurs and produced depictions that are more realistic than many paleontological reconstructions that endured until quite recently.

Keywords Bushmen, cave paintings, dinosaurs, Lesotho

INTRODUCTION

Dinosaur footprints and bones have served as a source of legend since earliest human history. For example, it now well accepted that the *"Griffin"* is a representation of the dinosaur *Protoceratops* (Mayor, 1991). Among the most remarkable records are the Bushmen cave paintings of ornithopods, herbivorous dinosaurs that existed from latest Triassic to the end Cretaceous. Here we document paintings from Mokhali cave, Lesotho (Fig. 1), depicting an ornithopod footprint, and in three different stances, the inferred trackmaker.

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HISTORICAL BACKGROUND

The native Bushmen, also known as the *!Kung* or *San* (Bushman language) people, had all but disappeared from nearly the whole of North and Central Africa by the mid-19th century (Bleek and Lloyd, 1911). Cave art was a major means of communication throughout their multi-millennial prehistoric past. Especially common in Lesotho (Bleek and Lloyd, 1911; Christol, 1930; Ellenberger, 1953) cave paintings are mostly confined to the "Cave Sandstone," a Lower Jurassic redbed sequence in which a prolific dinosaur trackway record is preserved throughout the entire region (Ellenberger, 1912, 1974).

The Mokhali cave (Fig. 1) is named for one of the warriors of Chief Molapo, son of the Sotho king Moshoeshoe. The paintings (Figs. 2, 3) are believed to have been executed between 1810 and 1820, shortly before Molapo (born 1814) came to rule the northern Lesotho, building his temporary huts in the cave around 1835. They were thus produced during the days of the last surviving Bushmen, when Molapo's son Jonathon expelled or killed nearly all of them (Ellenberger, 1912, 1953). The paintings were discovered in 1930 by one of us (PE) and traced directly from the wall of the cave. The locality was revisited in mid-July 2004 by two of us (D. J. M and A. D. M), and with the assistance of some local tribesmen, the Bushman cave of Mokhali was eventually located. Unfortunately, the paintings are in an advanced state of deterioration due to their location near the (eastern) extremity of the cave, a refuge relatively open and without any real protection from the elements. Nevertheless, we were able to relocate the paintings originally traced in 1930.

FIG. 1. Sketch of the Mokhali cave, 10 km by road east northeast of Leribe, Lesotho—from drawing by Christol (1930, p. 72). Cave is 10 meters high, 75 meters long. Paintings are at chest height, about 6 meters from the eastern end (left side) of the cave. Out of view about 10 meters left of the cave is a dinosaur skeleton *in situ*. Inset shows the location of the Mokhali cave in Lesotho.

THE PAINTINGS

An example of artistic realism, the painting of the footprint is of the same coloration as the Lower Jurassic redbeds. The painting, in red ochre, is reasonably well preserved and will be readily recognized by vertebrate paleoichnologists as belonging to an ornithopod (Fig. 2). Figure 3 shows the senior author's 1930 tracing of the footprint superimposed upon the cave painting, the close match confirming the two figures as one and the same object. Measurements of the footprint drawing, and the tracing originally made in 1930, show a footprint about 7 cm long and 10 cm wide with a divarication angle of about 100° (Figs. 2, 3). These proportions are fairly typical of ornithopod tracks such as *Anomoepus* or *Moyenosauripus* (Ellenberger, 1974), which are typically wider than long, as compared with theropod tracks which are longer than wide (Thulborn, 1990; Lockley, 1999, 2001). Thus, if the drawings predate the period 1810–1820, they also predate the earliest published account of this type of ornithopod track, or indeed any dinosaur track (Hitchcock, 1836, 1845).

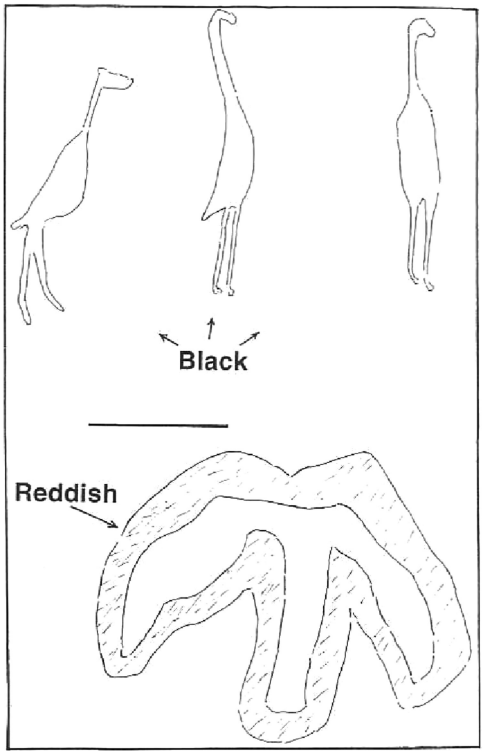

FIG. 2. Paintings from the eastern edge of the Mokhali cave show a dinosaur footprint and representations of the possible trackmaker. Scale bar = 5 cm. (after a tracing made in 1930 by Paul Ellenberger).

Beside the footprint, representations of three bipeds resembling ornithopods are outlined in black (charcoal and an unknown adhesive). This original black artwork, traced in 1930, is now virtually obliterated. The forms of the three figures are particularly revealing as they evidently show us how the Bushmen reconstructed the trackmaker from the footprint record. First and most striking is the upright bipedal stance. This shows astute perception on the part of these Paleolithic artists. The reconstruction can be compared with the cumbersome and unconvincing model of a quadrupedal ornithopod (iguanodont) assembled for public display at Crystal Palace in London by Sir Richard Owen in the latter half of the 19th century (Sarjeant, 1997). Second is the lack of forefoot depictions. These are presumably absent due to the rarity, in the Lesotho trackway record, of traces/tracks where ornithopods touched down with their forefeet (Ellenberger, 1974). Third is the lack of a depiction of a conspicuous tail. This may again reflect the paucity of evidence in the bipedal dinosaur trackway record of tail drag marks. This record of the Bushmen's artistic interpretation of trackway observations suggests that they viewed the trackmakers as large bird-like creatures. This view anticipates the interpretations of Hitchcock (1836), the father of modern vertebrate paleoichnology, who also worked only from Lower Jurassic tracks. Moreover, his interpretation of such tracks as those of "ornithoid marsupials" (Hitchcock, 1845) was actually further from the mark than the stork-like depictions of the Bushmen.

As the artwork suggests, the Bushmen artists were likely guided primarily by the track record, as there are no depictions of fossilized bone. There is a significant historic record of the Bushman's extraordinary prowess as a tracker of modern animals (Thomas, 1958; Van der Post, 1958; Lockley, 1999). We have no way of knowing if the Bushmen ever observed the tails and forearms of fossilized ornithopods or of other bipedal dinosaurs. However, it seems likely that they would have been familiar with skeletal remains of dinosaurs in Lesotho's Cave Sandstone. Indeed, the Mokhali cave dwellers must have seen a portion of a small dinosaur skeleton preserved *in situ* just 10 meters east of the eastern entrance to the cave. The pectoral girdle of this skeleton which measures about 40 cm in width,

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FIG. 3. Photograph of the Bushmen cave painting of a footprint of an ornithopod dinosaur showing an overlay of the tracing of the painting made in 1930 by the senior author. Bar gives scale. Photograph by Alexander Mossman. (See Color Plate I)

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is narrower than the pelvic area, thus indicating a true biped with small arms and prominent legs. A tail is not visible. The visibility of this skeleton is greatly accentuated by the results of eolian erosion of the Cave Sandstone. It forms a natural step along an ancient pathway leading up towards the nearby plateau. This skeleton is far closer to the painting of the footprint than to any dinosaur trackway. However, there is certainly no evidence that they tried to draw dinosaur reconstructions based on the observation of skeletal remains, a practice not undertaken by professional paleontologists with any success until the latter half of the 19th century. Certainly no Bushmen would ever have seen any material of this kind in a museum. Thus, one can make the case that the artistic portrayals (Fig. 2) represent a remarkably modern or realistic view of dinosaurs as elegant, erect, bird-like creatures, which contrasts with the rather sluggish, tail-dragging animals depicted in most western scientific literature until the early 1960s.

FOLKLORE

Prehistoric Bushmen folklore provides further insight into the imaginative thinking of these Paleolithic people. Collections by W. Bleek early in the 19th century indicate that the Bushmen were greatly intrigued by the ancient times preceding the existence of men. One might infer that this concept of a pre-human past is more in line with modern evolutionary thinking than certain fundamentalist religious doctrines. However, we must remember that the Bushman's concept of time was quite different from that of the modern geologist (Gebser, 1984). The prehistoric Bushmen sang about the early times, and about the monsters that made the huge beast-footed trackways in the red rock. Petrified bones of dinosaurs, so numerous in Lesotho, made a big impression on them.

Drawing on Bushmen mythology, a giant creature known as *//Khwai-hemm* was on ceremonial occasions fabricated to represent in character and appearance the dreaded "All-devourer." *//Khwai-hemm* occupied a central place in Bushmen folklore. One ought not be astonished that these grand connoisseurs of nature were interested and knowledgeable about dinosaurs. They would have had vivid impressions of giant footprints left by wandering dinosaurs, an experience that confers very strong dynamic images of dinosaurs as living, moving creatures (Paul, 1988; Lockley 1991; Farlow and Chapman, 1997). Surviving so close to nature, prehistoric Bushmen were not burdened with a codified religion denying so daring a concept as evolution and

the reality of extinction. Moreover, they knew instinctively that the fossilized tracks were real and must have represented once-living animals, even though extant relatives were not observed making tracks.

CONCLUSIONS

There was, then, an authentic Bushmen paleontology—the lethal prehistoric monster *//Khwai-hemm* (named *Kholumolumo* by the Sotho) had held primacy over all the creatures which were living on earth during the far old beginnings. The only things now visible are its tracks, or bones transformed into stone. By carefully observing the various Jurassic tracks the artist could reconstruct pictures of specific trackmakers, in effect bringing *//Khwai-hemm* and contemporary creatures back to life. The resulting delicate pictorial record, and the surviving songs and stories about dinosaur footprints and their makers, illustrate the perspicacity and genius of Bushmen trackers, hunters, and artists. Their interpretations were at least as convincing as those of 19th and early 20th century paleontologists.

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